

## REMARKS

In paragraph 1 of the Office Action claims 1-22 are rejected, stating:

“Claims 1-22 are rejected under 35 U.S.C. 11 first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The applicant recites a wafer having a plurality of test features placed thereon which project from the wafer surface. These test features are stated to be composed of a hard upper surface layer. The specification indicates that these test features are polished in a procedure wherein the process proceeds in a manner as depicted in Figure 1. This figure shows a timed sequence of the polishing process. It is not seen how if the test features 24 are composed of the same hard material how the test feature on 36 and 40 are removed prior to the features on elements 20 on the right of the drawing under T=2. If the material 24 is the same material for all elements 20, then the layers should be removed wherein each has a portion of element 24 thereon until the last bit is removed from all element 20s. Consequently, while the applicant claim is understandable the manner of polishing and the “polished” recitation on line 5 of claim 1 is not enabled by the specification. In other words, the examiner does not see how one would come up with the claimed device and achieve its aim in the polishing realm as highlighted in Figure 1.”

Responsive thereto, Applicant respectfully traverses this ground of rejection and asserts that the specification describes an operable device and that the claims are enabled by the specification, as is next described.

A key factor in understanding the present invention is that for the extremely small test features (diameters from .5 microns to perhaps 5 microns), the chemical mechanical polishing proceeds most rapidly (and linearly) from the edge of the test feature inwardly, rather than from the top surface downwardly (see Fig. 2). This polishing effect, from the outer edge inwardly, is depicted, for example, in Fig. 1, where attention is drawn to the largest diameter test feature in the right hand column. As depicted therein, at T = 0, the upper surface of the test feature is fully covered with a DLC layer. When a chemical mechanical polishing step is conducted, at T = 1, the chemical mechanical polishing has removed an outer edge portion of the DLC layer, such that a center portion 24 of the DLC layer remains and an outer ring 32 of the underlying material 20 is exposed due to the preferential polishing effect at the edge of the DLC layer 24. At T = 2, the polishing has proceeded further such that more of the edge portions of the DLC layer have been removed and a larger outer ring 32 of underlying material 20 is exposed. At T = 3, the

central DLC portion 24 is still smaller due to edge portion removal and a larger outer ring 32 of underlying material 20 is exposed. At  $T = 4$ , still further edge portions of the DLC layer have been removed, such that the central portion 24 is smaller still. At  $T = 5$  only a small central portion 24 of the DLC layer remains and a large exposed outer ring 32 of underlying material 20 is seen. At  $T = 6$ , all of the DLC layer has been removed and the full upper surface of the underlying test feature material is exposed.

Attention is next directed to the row of test features at time  $T = 1$ . It can be seen that where the chemical mechanical polishing process has been conducted for the time period  $T = 1$ , an equal edge portion of the DLC layer 24 of each of the test features (regardless of the diameter of the test feature within the small .5 micron to approximately 5 micron diameter range) has been removed. As a result, the exposed outer ring surface 32 of the underlying material 20 has the same radial width. Thereafter, with further polishing at time  $T = 2$ , the polishing removal of edge portions of the DLC layer result in smaller central portions 24 of the DLC layer remaining, and larger outer portions 32 of the underlying material 20 being exposed.

It is therefore to be understood that the polishing material removal rate from the edge portions of the hard DLC layer is a controlling factor in the exposure of the upper surface of the test features in the very small .5 to approximately 5 micron diameter range of the present invention. This polishing process is more fully described in the specification, page 7, line 17 through page 9, line 21.

Because the individual test features are too small to be seen with an optical microscope, arrays comprising a plurality of test features having an identical diameter are fabricated upon a wafer surface, where the arrays are large enough to be seen utilizing an optical microscope. Test features that maintain a significant central DLC layer portion appear dark, whereas test arrays having test features wherein the DLC layer is removed appear brightly, as is more fully described in the specification.

Therefore, claims 1-11 describe a wafer having a plurality of test arrays of the present invention formed thereon. Applicant respectfully submits that claims 1-11 are fully enabled by the teachings of the specification. Claims 12-22 have been amended, as is described below with regard to the rejection of paragraph 2 of the Office Action, and Applicant submits that these claims (process claims) are likewise fully enabled by the teachings of the specification.

In paragraph 2 of the Office Action claims 12-22 are rejected, stating:

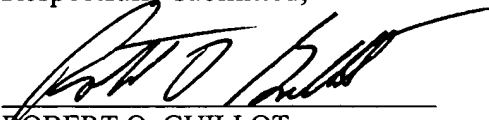
“Claims 12-22 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Steps in the formation of the magnetic head which are critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

The subject matter of the claims is drawn to a method or process of fabricating a magnetic head upon a wafer surface. However, the only steps recited are to the CMP processes. No steps are provided coupling this process with the formation of the magnetic head. The specification only couples the use of this CMP step with the magnetic head in only a general and unknown manner.”

Responsive hereto, Applicant has amended the preamble of each of claims 12-22 from a process for fabricating a magnetic head to a process for the chemical mechanical polishing of a wafer surface. Applicant submits that the limitations set forth in the claims fully support and enable the chemical mechanical polishing process of the present invention. Applicant therefore respectfully submits that this ground of rejection has been satisfied.

Having responded to all of the paragraphs of the Office Action, and having amended the claims accordingly, Applicant respectfully submits that the Application is now in condition for allowance. Applicant therefore respectfully requests that a Notice of Allowance be forthcoming at the Examiner's earliest opportunity. Should the Examiner have any questions or comments with regard to this amendment, a telephonic conference at the number set forth below is respectfully requested.

Respectfully submitted,


  
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**CERTIFICATE OF MAILING (37 CFR 1.8(a))**

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited on December 15, 2004 with the U.S. Postal Service as first class mail in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.  
Date: December 15, 2004

  
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